

REMARKS

In the Office Action dated March 23, 2005, the drawings were objected to because of certain inconsistencies between the drawings and the written portion of the specification. For each of the instances noted by the Examiner, a correction in the written portion of the specification has been made, thereby making changes to the drawings unnecessary.

Claims 1, 7, 8, 14 and 16 were objected to because of informalities noted by the Examiner. Of those claims, only claims 8 and 14 still remain in the application, and the Examiner's suggested changes have been made in those claims.

Claims 1 and 12 were rejected under 35 U.S.C. §102(e) as being anticipated by Richardson. Claims 2, 3, 8, 13 and 16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Richardson in view of Styrnol et al. Claims 4, 5 and 11 were also stated to be unpatentable under 35 U.S.C. §103(a) based on Richardson and Styrnol et al., however, in the detailed substantiation of this rejection, only the Richardson reference was mentioned, and there was no mention of the manner by which the teachings of Styrnol et al. enter into this rejection, if at all. Claims 6 and 15 were rejected under 35 U.S.C. §103(a) as being unpatentable over Richardson in view of Price et al. Claim 7 was rejected under 35 U.S.C. §103(a) as being unpatentable over Richardson in view of Price et al., further in view of Styrnol et al. Claims 9, 10 and 14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Richardson in view of Styrnol et al., further in view of Price et al.

In response, claims 1-7 have been cancelled, and independent claims 8 and 12 have been amended to make clear that the channel that is formed and in which the coolant conducted is formed by a leg surface of the electron beam deflector and

by the exterior surface of the corner of the X-ray tube housing. New dependent claims have been added stating that the channel is straight, and that the coolant flows therein in a straight flowpath entirely disposed substantially perpendicularly to the electron beam.

These independent claims and the remaining claims depending therefrom are submitted to be patentable over the teachings of the references relied upon by the Examiner for the following reasons.

In the Richardson reference, it is *not* the electron beam deflector that forms a channel with any part of the X-ray tube housing in which a coolant can flow. The structural details of the electron beam deflector 110 are not described in the Richardson reference, however, this element is simply shown as element 110 in Figure 1 and in the other figures. Figure 1 does not show the shield structure 500 that is provided *in addition to* the electron beam deflector 110. That structure is shown generally in Figure 3, and in more detail in Figures 3A through 5A of the Richardson reference. As can best be seen in Figure 3B, the actual electron beam deflector 110 does not form any part of the channel 506 in which coolant is conducted. The channel is formed exclusively by the shield structure 500 and the exterior surface of the X-ray tube. The Richardson reference is extremely unclear as to how, in all embodiments, the coolant is conducted. In Figure 3, element 110 is the electron beam deflector itself, as noted above. In Figure 3 the element 110 appears to occupy the entirety of the shield structure 500, and therefore although the "box" indicated by reference numeral 110 appears to be open and available for a coolant flow, it is actually completely filled by the deflector 110 (at least there is no further description in the Richardson reference on this point). The paragraph beginning at

column 7, line 31 of the Richardson reference, however, states that in Figure 3 of the deflector device 110 is positioned for the enclosure 102 so as to define a flowpath 506 that directs liquid coolant into substantially adjacent contact with both the deflector device 110 and the aperture portion 104. If this is the case, it is clear that there is no coolant flowing *between* the deflector 110 and the exterior surface of the X-ray tube. The path for coolant flow is formed by the outside of the beam deflector, and the shield structure 500, and the X-ray tube wall forms no part of this flowpath.

In the embodiment shown in Figures 3A and 3B, the flowpath is defined completely within the shield structure 500, and this embodiment is specifically stated, at column 7, lines 39-41, to form an isolation chamber 507 that *isolates* deflector device 110 from direct contact with liquid coolant 302.

Therefore, in neither embodiment is a flowpath formed by the exterior surface of a corner of the X-ray tube and a leg surface of the electron beam deflector, as set forth in independent claims 8 and 12. Moreover, in the subject matter disclosed and claimed in the present application, the channel for the coolant is straight, as opposed to the channel having at least two corners (when seen in the views of Figures 3A and 3B) or a circle (if seen in a sectional view taken in a plane perpendicular to the direction of the electron beam (that propagates vertically through the region 104 of Figure 3B)). Again, because precise details of the manner of coolant flow through the channel are not provided in Richardson, it is not clear precisely which directions the coolant will flow, or possibly even in a combination of directions, however, it is clear that there will always be at least some component of the coolant that is flowing in a direction generally parallel to the direction of the electron beam. As set forth in new

claims 18 and 20, the flowpath is entirely disposed substantially perpendicularly to the electron beam.

Of the claims remaining in the application, only claim 12 was rejected under 35 U.S.C. §102(e) as being anticipated by Richardson. For the above reasons, Applicants submit that the Richardson reference does not disclose all of the method steps of claim 12, and therefore the Richardson reference does not anticipate amended claim 12.

Independent claim 8 was rejected as being obvious based on the teachings of Richardson in view of Styrnol et al. Despite the passages in the Richardson reference noted by the Examiner regarding varying the size and shape of the passage for coolant flow, as noted above there is no structure anywhere in the Richardson reference wherein the channel is formed by a combination of a leg surface of the electron beam deflector and the exterior surface of a corner of the X-ray tube. Modifying any of the embodiments disclosed in the Richardson reference to make use of those surfaces to form a coolant channel would be a substantial redesign of the Richardson reference, rather than a simple modification thereof. Moreover, this would be inconsistent at least with the embodiment of Figures 3A and 3B of the Richardson reference, which is explicitly stated to be for the purpose of isolating the coolant flow channel from the electron beam deflector.

Applicants therefore respectfully submit that even if the Richardson reference were modified in accordance with the teachings of Styrnol et al., a structure as set forth in claim 8 still would not result. Claim 8 therefore would not have been obvious to a person of ordinary skill in the field of X-ray tube cooling system design based on the teachings of Richardson and Styrnol et al.

The dependent claims respectively depending from claims 8 and 12 are submitted to be patentable over the references relied upon by the Examiner for the same reasons discussed above in connection with the independent claims. Even if the teachings of the further secondary references cited by the Examiner were used as a basis for modifying the Richardson reference, for the reasons noted above neither a structure nor a method corresponding to the dependent claims, which respectively embody the subject matter of the independent claims therein, would result.

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

Submitted by,



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